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ABSTRACT

Several intermediate performance objectives and corresponding criterion measures are listed for each of 32 terminal objectives for an intermediate (second year) radio/TV servicing course. This 1-year course (3 hours daily) was designed to provide the student with the basic skills and knowledges necessary for entry level employment in the Radio/TV servicing field. Titles of the 32 terminal objectives are Radio Trade History, Use of Hand Tools, Shop Safety Practices, Basic Florida Licensing Regulations, Shop Practices and Materials, Radio Math Review, Radio Theory, Use of Radio Test Equipment, Vacuum Tube Theory, Transistor Theory, Audio Amplifiers, AM Radio Receivers, Servicing Procedures on AM Radios, Alignment Procedures, Turntables, Tape Recorders, FM Sets, Stereo Sets, Black/White Television History, Television Math Applications, Black/White Television Servicing, Shop Techniques and Materials, Television Audio Circuits, Video Circuits, Tuner Circuits, Sync Circuits, Sweep Circuits, TV Servicing and Alignment, TV Antenna Installations, Florida Law, and Employer/Employee/Customer Relations. (This manual and 54 others were developed for various secondary level vocational courses using the System Approach for Education (SAFE) guidelines.) (HD)

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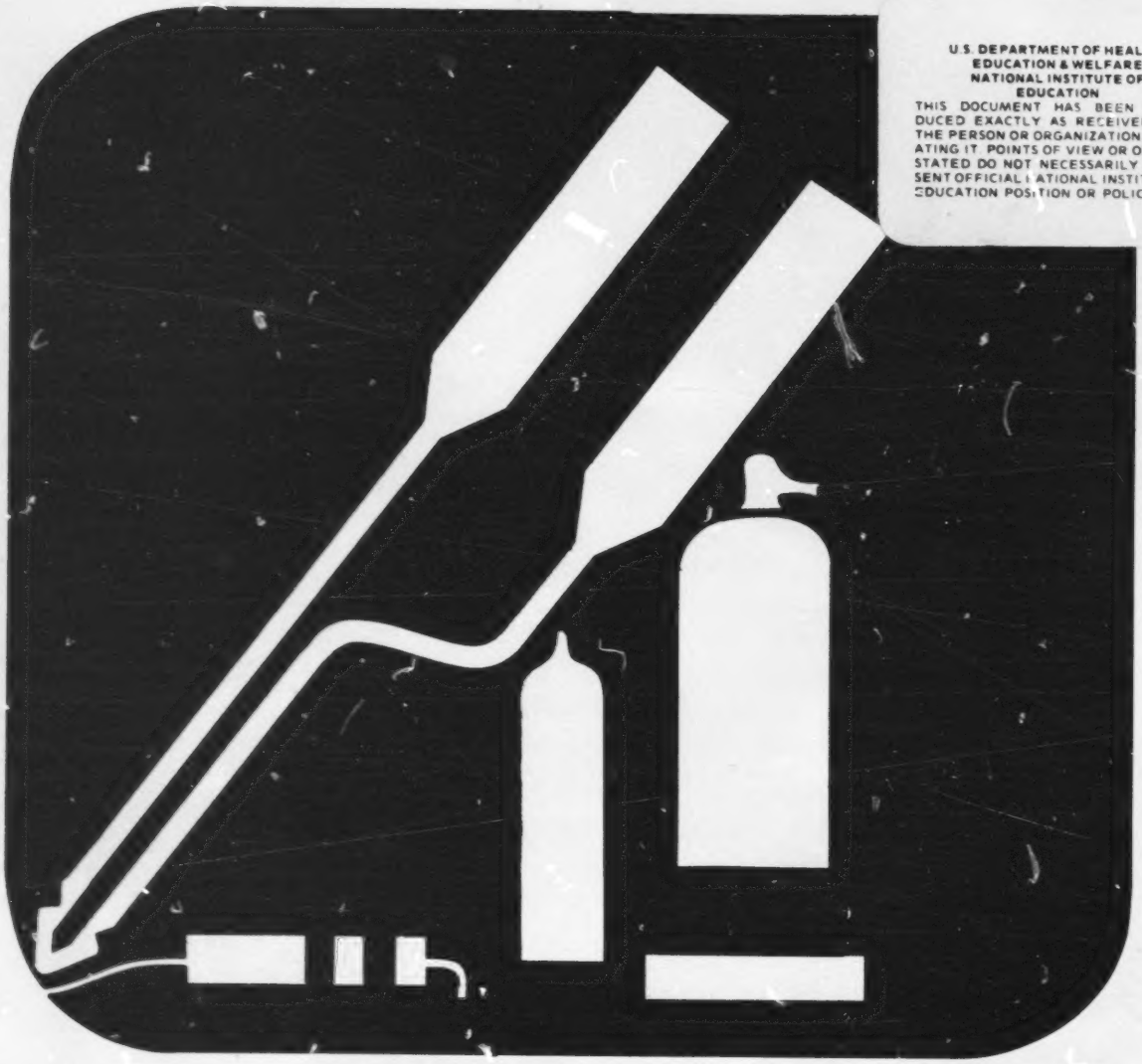
radio and television servicing

INTERMEDIATE COURSE



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July, 1973

MAKE UP AND USE OF THIS MANUAL

Definitions

Terminal Performance Objectives–are objectives referring to a behavior, knowledge, or skill you want the learner to demonstrate at the end of a particular unit or section. They are written in gross, overall terms.

Intermediate Performance Objectives–are sub-functions of terminal objectives referring to a behavior, knowledge, or skill you want the learner to demonstrate along the way towards mastery of the terminal objectives. They are written in specific terms.

Criterion Measures–are the actual test of evaluation exactly as it will be presented to the learner to see if he has met the objectives.

Levels of Performance–The levels of performance (how well it must be) given in this manual have been arrived at by the authors through past experiences and by consultation with many Career Education teachers in Duval County. These levels are subject to change after try out. They were written as average levels of attainment that all students should achieve. This by no means limits the instructor, who can teach as far above the levels as possible.

These Objectives are Minimal–The objectives in this manual represent the basic "need to know" knowledge and skills that should be attainable by any student that meets the prerequisites of the course.

Course Prerequisites–The prerequisites for these courses may need revision. For example, if your course calls for a certain skill in reading ability and you are not getting students of this ability that can perform up to the course standards, then a prerequisite of "must be able to read at the — level" may be needed.

Learning Units–Student activities are individualized learning units designed to give the student a chance to advance at his own rate of speed with the minimum amount of help from the instructor.

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INTERMEDIATE

RADIO/TV SERVICING

Course Description

The Intermediate Radio/TV Servicing Program is a one-year 3-hour a day course that is designed to provide the student with the basic skills and knowledges necessary for entry level employment in the Radio/TV Servicing Field.

The curriculum includes the following things: Radio/TV History, Use of Hand Tools, Safety, Basic Licensing Provisions, Shop Practices, Use of Test Equipment, Vacuum Tube Theory, Transistor Theory, Printed Circuits, Audio Amplifiers, AM Radio Receivers, Servicing and Troubleshooting TV Sets and servicing of home entertainment electronic equipment.

Time Block, 3 Hrs. Daily for 180 days, 540 Total Hours

SYLLABUS OF TERMINAL PERFORMANCE OBJECTIVES

FOR

RADIO/TV SERVICING II

1.0 Radio Trade History

2.0 Use of Hand Tools

3.0 Shop Safety Practices

4.0 Basic Florida Licensing Reg.

5.0 Shop Practices and Materials

6.0 Radio Math Review

7.0 Radio Theory

8.0 Use of Radio Test Equipment

9.0 Vacuum Tube Theory

10.0 Transistor Theory

12.0 Audio Amplifiers

13.0 AM Radio Receivers

14.0 Servicing Procedures on AM Radios

15.0 Alignment Procedures

16.0 Turntables

17.0 Tape Recorders

SYLIABUS OF TERMINAL PERFORMANCE OBJECTIVES

FOR

RADIO/TV SERVICING II

TPO

18.0 FM Sets

19.0 Stereo Sets

20.0 Black/White Television History

21.0 Television Math Applications

22.0 Black/White Television Servicing

23.0 Shop Techniques & Materials

24.0 Television Audio Circuits

25.0 Video Circuits

26.0 Tuner Circuits

27.0 Sync Circuits

28.0 Sweep Circuits

29.0 TV Servicing and Alignment

30.0 TV Antenna Installations

31.0 Florida Law

32.0 Employer/Employee/Customer Relation

GOALS

No. 1 To provide the learner with the opportunity to learn the skills and techniques used in the day-to-day practice in Radio and Television Servicing.

No. 2 To provide the learner with learning experiences on up to date equipment and give him the opportunity to gain the necessary knowledge and practices in its use.

No. 3 To provide the learner with the background information, theory and related skills upon which he may build a life time career in electronics.

No. 4 To provide the learner with realistic and relevant shop experiences which will develop his self confidence in his knowledge and skills.

No. 5 To help the learner develop an awareness of his place in society and his responsibility to be a productive member of that society.

No. 6 To help the learner develop personal attributes in his work habits, personal relationships, and attitude which will help him to become a valued employee and co-worker.

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

Radio Trades History

The learner will, at 80% accuracy, state in sequence the specific development in the field of communication which led to the present use of Radio and Television.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.1	Given a list of developments and events beginning with the development of the telegraph and continuing up through the development of solid state devices, the learner will number them in the order of their occurance.	1.1	Correctly number in sequence not less than 7 of the following events. 1.___Development of Triode Tube 2.___Intelligence transmitted across space. 3.___First television camera 4.___First transmission of electro-magnetic energy across space 5.___FCC established 6.___Development of Diode tube 7.___Development of Cathode Ray Tube 8.___First all electronic color television 9.___Voice first sent through space
1.2	Given two lists, one containing developments and events, the other containing names of individuals associated with those developments and events, the learner will match name to development.	1.2	Correctly match the name of the individual concerned to the following list of events. (Minimum of five correct required) 1. Development of triode tube 2. Intelligence first transmitted 3. First television camera 4. Voice transmitted 5. Cathode ray tube 6. First patent for television system 7. First photo cell a. Zworykin b. Fleming c. DeForest d. Rosing e. May f. Faraday g. Fessendon h. Marconi i. Braun

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

Radio Trades History

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.3	Given two lists, one containing developments and events and the other containing names of individuals associated with those developments and events, the learner will match name to development.	1.3	Match the correct date to not less than 7 of the following events. 1. First transmission of electro-magnetic energy through space. 2. Intelligence transmitted across space 3. Development of triode tube 4. First television camera 5. FCC established 6. Voice sent through space 7. Development of Diode tube 8. First all electronic color T. V. 9. First Cathode Ray Tube a. 1892 b. 1896 c. 1904 d. 1906 e. 1914 f. 1923 g. 1926 h. 1946 i. 1906

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE - INTERMEDIATE

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0 — Use of Hand Tools

The learner will identify the hand tools associated with Radio and Television Servicing and will use them correctly.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
.1	Given the following hand tools the learner will, at 80% proficiency, identify each tool by name and function. a. Pliers (slip joint) b. Pliers (needle nose) c. Diagonal cutters d. Wire Strippers e. Screwdriver (slot) f. Screwdriver (Phillips) g. Nutdriver h. Soldering iron i. Soldering aids j. adjustable wrench k. Reamer 1. Tuning tool	2.1	Given an assortment of hand tools by the instructor, you are to correctly identify by name and function not less than 80% of the tools either orally or in writing.
.2	The learner will correctly use the hand tools in the performance of laboratory and servicing assignments, 80% proficiency is required.	2.2	The instructor will observe your usage of hand tools daily and evaluate your ability to use hand tools on a random basis, but not less than twice during a grading period. You will be evaluated according to the following scale and a score of 80% or better is required. 20 points - Safety 20 points - Using Correct Tool 20 points - Proper use of Tool 20 points - Care of tools while in use 20 points - Tool Storage

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

SHOP SAFETY PRACTICES

The learner will write seven specific safety rules, Define the terms, "Electrical isolation" and Chassis ground", state the voltages that may be found in various types of common home entertainment equipment.

No.	Intermediate Performance Objectives	No.	Criterion Measures
3.1	The learner will write 7 specific safety rules pertaining to laboratory and servicing work. 1. Turn off the power by unplugging the cord whenever you make any change in circuit wiring. 2. Use only one hand when you take measurements. Attach one terminal of your meter to ground or chassis with an alligator clip so you handle only one test probe. 3. When measuring high voltages, it is best to clip both test leads in place while the power is off so that you won't have to hold either lead. 4. Don't switch meter ranges while holding a hot test probe in place. The meter panel may be grounded so that you get a shock between the panel and the hot probe. 5. Always support the equipment securely before working on it. If an operating receiver starts to a fall over, you may grab it instinctively and receive an electrical shock. 6. Never touch a grounded object or stand on a cement floor when working on a chassis, particularly one that uses a transformerless power supply. 7. Use an Isolation transformer or make sure that the power cord is plugged into the power outlet so that your receiver chassis is at ground potential.	3.1	List 7 safety rules to be followed in laboratory and servicing work.

ACCREDITATION NUMBER 9765

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

SHOP SAFETY PRACTICES

No.	Intermediate Performance Objectives	No.	Criterion Measures
3.2	The learner will define the terms "Electrical isolation" and "Chassis ground".	3.2	Define the terms below: 1. Electrical isolation 2. Chassis ground
3.3	Given a list of commonly used home entertainment equipment the learner will list the maximum voltages that may be found in that equipment. 1. Pocket transistor radio- 9 volts 2. AC transister radio- 120 volts 3. Vacuum tube radio- 500 volts 4. Vacuum tube amplifier- 750 volts 5. Black & White television- 20,000 volts 6. Color television- 25,000 volts	3.3	List the maximum voltages that may be found in the following: 1. Pocket transistor radio 2. AC transistor radio 3. Vacuum tube radio 4. Vacuum tube amplifier 5. Black & White television 6. Color television
3.4	(1) List the two dangers that are inherent in handling television picture tubes: a. High voltage b. Implosion (2) List the special items of clothing which should be worn while handling picture tubes.	3.4	(1) List the two dangers that are inherent in handling television picture tubes: a. High voltage b. Implosion (2) List the special items of clothing which should be worn while handling picture tubes.

ACCREDITATION NUMBER 9785

COURSE TITLE: Radio/Television Service II

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

BASIC FLORIDA LICENSING REGS.

The learner will, with 80% proficiency describe the "Florida Electronics Service Act of 1970" Chapter 70-111 of the Florida Statutes, List the procedures for registration, and the cost of registration, the penalties for violation of the act, describe procedures for collection and payment of sales tax.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.1	Given questions in multiple choice or completion form, the learner will demonstrate his understanding of the "Florida Electronic Service Act of 1970 by scoring 80% or better on the test.	4.1	a. What is the purpose of the "Florida Electronic Service Act of 1970? b. What effect does the "Act" have on Dealers? C. What effect does the "Act" have on service technicians?
4.2	The learner will state the requirements for registration as an Electronic Service Dealer.	4.2	State the requirements for registration as an Electronic service dealer.
4.3	The learner will state the cost of registration for each place of business and the cost of the annual renewal fee.	4.3	The cost of registration will be not less than $_____ nor more than $_____.
4.4	The learner will describe the penalties that may be imposed upon persons who violate the "Florida Electronic Service Act of 1970.	4.4	Any person who violates the "Act" shall be fined not less than $_____ nor more than $ _____ or sentenced to imprisonment of not more than _____ or both.
4.5	The learner will describe the procedure for collection and payment of the Florida State sales tax.	4.5	Describe the procedure for collection and payment of Florida State Sales tax.

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

Shop Practices and Materials

The learner will name the base metals used in solder, the type of flux used in electrical work and properly solder electrical connections. The learner will select the correct type of wire to be used in selected repair problems including high and low voltages, high and low current, and demonstrate correct shop practices related to cleanliness, inventory, tool care and equipment care.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.1	The learner will name the following: 1. Base metals in solder 2. Flux used for electrical work	5.1	The two base metals in solder are _____ and _____. The flux used in electrical work is _____.
5.2	The learner will explain the reason for using flux.	5.2	Explain the reason that flux is used.
5.3	The learner will correctly solder 5 electrical connections.	5.3	Solder electrical connections given you.
5.4	Given a list of typical servicing problems involving high and low voltages, and high and low currents, the learner will select the correct type of electrical wire to be used in each repair.	5.4	What type of wire should be used in the circuits listed below? a. Filament b. Power transformer leads c. Biasing circuits d. Television high voltage circuit
5.5	The learner will state the reasons for shop cleanliness, shop inventory, proper tool and equipment care.	5.5	State the reasons for each of the following: a. Shop cleanliness b. Shop Inventory c. Tool care d. Equipment care
5.6	The learner will demonstrate the correct procedures associated with shop cleanliness, shop inventory, tool and equipment care.	5.6	You will be evaluated daily on your conduct associated with shop cleanliness, shop inventory, tool and equipment care.
5.7	The learner will list the procedures to be followed when handling customer equipment to prevent damage, lost parts, incorrect billing, and insure complete and accurate shop records.	5.7	List the procedures to be followed when handling customer equipment to prevent damage, lost parts, insure correct billing and complete records.

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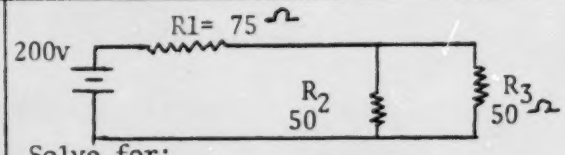
COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

Radio Math. Review

The learner will demonstrate his ability to solve math problems associated with Series and Parallel D. C. circuits, Inductance and Capacitance, Inductive Reactance and Capacitive Reactance, RL and RC time, and Resonant circuits.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.1	The learner will solve math problems related to DC Series, Parallel and Combination circuits.	6.1	 Solve for: I_T ER_1 IR_1 Ptot. PR_3 R_T ER_2 IR_2 PR_1 ER_3 IR_3 PR_2
6.2	The learner will solve math problems concerning Inductance and Capacitance connected in series and parallel to AC circuits.	6.2	What is the total inductance of two 10 henry coils connected in series? What is the total capacitance of two 10 ufd capacitors connected in series?
6.3	The learner will solve math problems involving Inductive Reactance and Capacitive Reactance.	6.3	A 2 henry coil and a .1 ufd capacitor are connected in a circuit with a frequency of 1 kilohertz. (1) X_L equals _____ (2) X_C equals _____
6.4	The learner will solve math problems concerning RL and RC time constants.	6.4	What is the time constant for a 2 henry coil and a 1000 ohm resistor? What is the time constant for a 1 ufd. capacitor and a 10,000 ohm resistor?
6.5	The learner will solve math problems concerning the relationships between voltage current, frequency and impedance in resonant circuits, (Series and Parallel)	6.5	What is the resonant freq. for a .01 ufd capacitor and a 2 millihenry coil? If the components in the above problem are connected in series the impedance will Inc./Dec. as the frequency is brought closer to resonance.

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 7.0 — RADIO THEORY

No.	Intermediate Performance Objectives	No.	Criterion Measures
7.1	The learner will draw a block diagram of a typical superheterodyne AM receiver containing the following: 1. RF amp. 2. Local Oscillator 3. Mixer 4. Two IF stages 5. Detector 6. AF amp. 7. Power supply	7.1	Draw a block diagram of a Superheterodyne AM receiver.
7.2	The learner will identify each section of a typical superheterodyne AM receiver and state the purpose of that stage.	7.2	Identify each stage of the Superheterodyne AM receiver and state the purpose of each stage on the block diagram.
7.3	The learner will state the primary difference between a TRF receiver and a superhet receiver.	7.3	State the primary difference between a TRF receiver and a superhet receiver.
7.4	The learner will define the term "Amplitude Modulation".	7.4	Define the term "Amplitude Modulation".

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 8.0

USE OF RADIO TEST EQUIPMENT

The learner will, with 80% proficiency, identify in writing, the controls, scales, and output and/or input jacks on the V.O.M., power supply, V.T.V.M., sine and square wave generator, R.F. generator, and the oscilloscope sheets, and the experiment handbook.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
8.1	The learner will demonstrate how to use the volt-ohm milliampmeter by identifying the functions of the control knobs, out-put jacks and scales. The learner will also take and note resistance, voltage and current measurements.	8.1	1) Given a VOM, you are to identify the functions of the control knobs, out-put jacks and scales. 2) Given three carbon resistors, and VOM, measure the value of each resistor and note results in writing. 3) Given the laboratory equipment, experiment sheet, a VOM series and circuit, measure voltage and current in this circuit.
8.2	The learner will identify the controls, output jacks and leads on the power supply.	8.2	On a power supply, identify the functions of the controls, output jacks, leads and safety factors to consider when in use.
8.3	The learner will set up an experiment using a direct current voltmeter to correctly adjust voltages required of the power supply for the experiment.	8.3	Use the direct current voltmeter to set power supply to correct voltages as required in experiment sheet.
.4	The learner will give a written explanation concerning the advantages of the VTVM, identify the output jacks and leads and set up and connect the VTVM to measure voltages in a given circuit.	8.4	1) Briefty write two advantages of the VTVM over the VOM. 2) Given a VTVM, identify the controls, output jacks and scales. 3) Construct a series circuit according to experiment sheet and measure voltages with VTVM as required.
.5	The learner will identify the controls and jacks on the sine/square wave generator. The learner will also set up the generator to assigned frequencies, find an unknown frequency, and with the aid of the oscilloscope, set up a square wave to be displayed on the scope.		

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 8.0

USE OF RADIO TEST EQUIPMENT

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
8.6	The learner will give a written description of the controls and output jacks on the RF generator for an output in each of its frequency bands and will set up the generator for use as an audio generator.	8.5	1) Given a sine/square wave generator, you are to identify the various controls and jacks. 2) Set up the sine/square wave generator to the assigned frequencies according to experiment sheet. 3) Given an unknown frequency source, you will use the sine/square wave generator and an O'scope to measure the unknown frequency by the comparison method. 4) Set up the sine/square wave generator to display a square wave on the O'scope.
8.7	The learner will, given an oscilloscope, locate and describe each of the controls, set up and operate each of these controls, display a 60 Hz sine wave, and calibrate the scope and measure unknown voltages.	8.6	1) Given a diagram of the RF generator, identify in writing the various controls and out-put jacks. 2) Given a frequency assigned in each of the bands, set up for output in each of these.

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 8.0 (Cont'd) USE OF RADIO TEST EQUIPMENT

No.	Intermediate Performance Objectives	No.	Criterion Measures
		8.7	(1) Using the laboratory equipment and an experiment sheet, perform the following operations on the O'scope: a) display spot on screen b) center spot on screen c) use intensity and focus controls on spot. d) display horizontal line on screen e) display 60 Hz sine wave on screen and analyze it according to experiment sheet using all controls on scope. (2) Using the O'scope, the test equipment and an experiment sheet, measure the various voltages as given on the experiment sheet and measure and compare these voltages with the VTVM.

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 9.0 VACUUM TUBE THEORY

With 80% proficiency, the learner will define the basic terms connected with vacuum tube theory. He will explain the operation of, and draw schematics for, diode, triode, and pentode tubes. He will demonstrate the proper use of the tube manual and identify the three classes of amplifiers. He will identify in writing, the elements of a pentagrid converter tube.

No.	Intermediate Performance Objectives	No.	Criterion Measures
9.1	The learner will identify in writing the following tube terms: 1) Thermionic emission 2) Space charge 3) cathode 4) plate 5) control grid 6) bias 7) amplification 8) rectification 9) filament 10) AC component 11) DC component 12) input signal	9.1	Define: 1) Thermionic emission 2) Space charge 3) cathode 4) plate 5) control grid 6) bias 7) amplification 8) rectification 9) filament 10) AC component 11) DC component 12) input signal
9.2	Given schematics of a diode, triode and pentode tube, the learner will describe in writing how each operate.	9.2	Write a description of the operation of the three tubes from the schematics given you.
9.3	The learner will identify in writing the three classes of amplifiers.	9.3	Identify in writing a class A, B, and C amplifier.
9.4	The learner will demonstrate the ability to use a tube manual to locate type, use, and base diagram of tubes.	9.4	Using the tube manual, locate and orally identify the five tube numbers given as to type, use, and base description.

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0

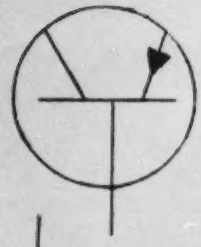
TRANSISTOR THEORY

The learner will, with 80% proficiency, give written explanations concerning the fundamentals of semiconductor theory including terms, P & N type materials, potential barrier, forward and reverse bias, electron and hole flow, conduct electronic experiments to prove the theory and operation of PN junction diodes, list 5 reasons for using transistors, identify given transistor symbols and terms, draw symbols and circuits showing basic transistor amplifier configurations and describe the operation of each.

No.	Intermediate Performance Objectives	No.	Criterion Measures
10.1	Given a list of semiconductor terms, the learner will give a written description of each.	10.1	(Attached next page)
10.2	The learner will give a written definition and description of P and N type crystals.	10.2	Define and describe the following: 1) P type crystal 2) N type crystal
10.3	The learner will, by drawing and writing explain the formation of a potential barrier at the junction of the P & N crystals.	10.3	Draw and write an explanation of the formation of a potential barrier at the junction of the P and N crystal.
10.4	The learner will give a written explanation of forward and reverse bias.	10.4	Define, in writing, the following terms: 1) Forward bias 2) Reverse bias
10.5	The learner will write a description of the terms "Electron flow" and "hole flow".	10.5	Define, in writing, the following semiconductor terms: 1) electron flow 2) hole flow
10.6	The learner will define the following terms with 80% accuracy. 1) Diode 2) Heat sink 3) interelement capacitance 4) rectifier 5) Zener diode 6) silicon controlled rect. 7) avalanche voltage	10.6	Define a given list of semiconductor diode terms in one or more sentences.
10.7	Given an experiment sheet and equipment the learner will conduct resistance measurements and observe waveform variations with a PN junction diode.	10.7	Given an experiment sheet and the necessary equipment, conduct the experiments, make measurements and observe waveforms demonstrating the characteristics of the semiconductor diode.

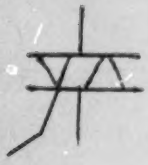
CRITERION MEASURE

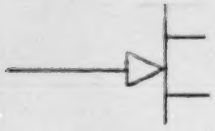
10.1

A. 

B.

C.

D. 

E. 

a. Select the proper symbol for a Zener Diode and describe its operation.

b. Select the proper symbol for a "Silicon Controlled Rectifier" and describe its operation.

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0 TRANSISTOR THEORY

No.	Intermediate Performance Objectives	No.	Criterion Measures
	(cont'd)		
10.8	The learner will define the following terms: 1) half wave rectifier 2) full wave rectifier 3) bridge rectifier 4) voltage doubler 5) filter	10.8	Define: 1. half wave rectifier 2. full wave rectifier 3. bridge rectifier 4. voltage doubler 5. filter
10.9	The learner will identify a Zener diode and a silicon controlled rectifier from schematic symbols and describe the operation of each.	10.9	(Attached next page)
10.10	The learner will construct each of the following circuits and perform the necessary experiments to analyze the operation of each. 1) half-wave filtered power supply. 2) full-wave filtered power supply. 3) full-wave bridge filtered power supply 4) voltage doubler power supply	10.10	Given an experiment sheet and the necessary equipment you are to construct four types of power supply and perform the desired measurements and observe the waveforms in order to analyze the characteristics of each type of power supply.
10.11	The learner will define each of the following terms: 1. PNP transistor 2. NPN transistor	10.11	Define the following terms: 1. PNP transistor 2. NPN transistor
10.12	The learner will list 5 advantages that the transistor has over vacuum tubes.	10.12	List 5 advantages of the transistor over the vacuum tube.

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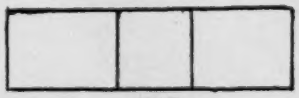
COURSE TITLE: RADIO TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0 (cont'd) TRANSISTOR THEORY

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
	(cont'd)	10.13	Define the following symbols: (1) I_C (5) Vc (9) hfe (2) I_B (6) Δ Ic (10) I_E (3) ic (7) Vce (4) rb (8) Ai
10.13	Given 10 letter symbols of solid state devices, the learner will define at least 9 of them.		
10.14	Given the following term the learner will draw the symbol that is used to represent each. 1) PNP transistor 2) NPN transistor 3) Semiconductor diode 4) alpha 5) beta	10.14	Draw the symbol that is used to represent each of the following: 1. PNP transistor 2. NPN transistor 3. semiconductor diode 4. alpha 5. beta
10.15	Given a block diagram of a PNP transistor, the learner will draw in symbols representing the charges present in each section and will shade the areas representing the deletion areas.	10.15	Label the charges present in each area and shade in the areas representing the depletion regions in this block diagram of a PNP transistor  PNP
10.16	The learner will draw schematic diagrams showing an NPN and a PNP transistor connected to batteries for correct base-emitter bias and base/ collector bias.	10.16	Draw schematic diagrams showing NPN and PNP transistors properly biased for operation.
10.17	The learner will define the following terms at 80% accuracy. 1) Power transistor 2) efficiency 3) single ended power amplifier 4) push, pull power amplifier 5) distortion 6) complimentary symmetry 7) phase splitter 8) phase inverter	10.17	Define the following terms: 1) Power transistor 2) efficiency 3) single ended power amplifier 4) push, pull power amplifier 5) distortion 6) complimentary symmetry 7) phase splitter 8) phase inverter

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0 (cont'd) TRANSISTOR THEORY

No.	Intermediate Performance Objectives	No.	Criterion Measures
	(cont'd)		
10.18	The learner will conduct electronic experiments to prove, observe and record data of the theory of operation of common base, common emitter, common collector amplifiers, bias stabilization, and RC network biasing of amplifier circuits at 30% accuracy.	10.18	Using experiment sheets and necessary equipment, construct a common base, common emitter, common collector circuits and perform the desired measurements and observations, recording data as requested.

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 11.0

PRINTED CIRCUITS

The learner will define a printed circuit, will find the open in a defective printed circuit and will correctly repair a given open circuit board.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
11.1	The learner will define a printed circuit.	11.1	Define in writing a printed circuit.
11.2	Given a printed circuit board with an open (crack) circuit path, the learner will find the open using a VOM.	11.2	Trace all circuit paths on the printed circuit board given you with the V.O.M. When you find an open, draw a circle around it.
11.3	Given a printed circuit board with a cracked conductor, the learner will correctly solder a small wire bridge over the open (crack) circuit.	11.3	Find and repair the open circuit on the printed circuit board given you, using a fine wire bridge and solder.

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

AUDIO AMPLIFIERS

Given schematic diagrams of Audio voltage amplifiers and Audio power amplifiers (transistor and Vacuum tube), the learner will, with 80% proficiency, identify and state the pupose for each component, trace the path for DC current, trace the signal path and identify probable causes of specific malfunctions.

No.	Intermediate Performance Objectives	No.	Criterion Measures
12.1	Given a schematic diagram of a triode vacuum tube audio frequency voltage amplifier, the learner will at 80% accuracy: 1. Identify and state the purpose for each component. 2. Trace the DC current path through the circuit. 3. Trace the signal path through the circuit.	12.1	On a given schematic diagram of triode vacuum tube AF voltage amplifier, you will use one color pencil to trace the DC current path, showing the direction of current flow and the polarity of voltage drops through the circuit, then use another color to trace the signal path through the circuit showing phase relationships and amplitude changes. You will then list each component in the circuit by name (coupling, capacitor, plate resistor, ect.) and state its purpose.
12.2	Given a schematic diagram of a transistor audio frequency voltage amplifier, the learner will at 80% accuracy: 1. 2. (repeat above) 3.	12.2	Given a schematic diagram of a transistorized AF voltage amplifier, you will repeat the procedure given above.
12.3	Given a schematic diagram of an RC coupled, single ended power amplifier, using a pentode tube and speaker, the learner will at 80% accuracy: 1. 2. (repeat above) 3.	12.3	Given a schematic diagram of an RC coupled, single ended power amplifier using a pentode tube and speaker, you will repeat the procedure given above.
12.4	Given a schematic diagram of a transformer coupled push, pull audio power amplifier using a driver stage and fed to a speaker, the learner will at 80% accuracy: 1. 2. (repeat above) 3.	12.4	Given a schematic diagram of a transformer coupled push/pull AF power amplifier using a driver stage and fed to a speaker, you will repeat procedure given above.

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0 (cont'd) AUDIO AMPLIFIERS

No.	Intermediate Performance Objectives	No.	Criterion Measures
12.5	Given a schematic diagram of a typical audio frequency amplifier, the learner will construct, analyze and perform trouble shooting procedures.	12.5	Construct audio frequency amplifiers according to experiment sheet and perform the analysis as indicated.

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

AM RADIO RECEIVERS

The learner will, with 80% accuracy, construct and analyze a typical five tube superheterodyne receiver, and a typical transistorized AM receiver.

No.	Intermediate Performance Objectives	No.	Criterion Measures
13.1	Given a schematic diagram of a typical 5 tube AM superheterodyne receiver the learner will at 80% accuracy: 1) identify each stage and state the purpose of that stage. 2) Trace the DC current path from the power supply through each of the stages. 3) Trace the signal path through each stage from antenna to speaker. 4) Construct the receiver. 5) Analyze the operation of each stage of the receiver, including DC voltage measurements and peak-to-peak measurements.	13.1	Given a schematic diagram of a typical 5 tube AC/DC AM receiver, (Fabri-tek SP 201A or comparable unit) Do the following: 1) Identify in writing each stage and state the purpose of that stage. 2) Use one color pencil to trace the DC current from the power supply through each of the stages. 3) Use another color pencil and trace the signal path from the antenna through to the speaker. 4) Construct the receiver. 5) Analyze the operation of each stage of the receiver according to the experiment sheets recording all required data.
13.2	Given a schematic diagram of typical transistorized AM superheterodyne receiver, the student will at 80% accuracy: 1. 2. 3. (repeat above) 4. 5.	13.2	Given a schematic diagram of a typical transistorized AM receiver (Philco trainer or comparable unit), Do the following: 1. 2. repeat each step as 3. required above 4. 5.

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 14.0

SERVICING PROCEDURES ON AM RADIOS

The learner will demonstrate the ability to use the signal generator, O'scope, VTVM, hand tools, and correct servicng techniques to service AM radios.

No.	Intermediate Performance Objectives	No.	Criterion Measures
14.1	Given a previously constructed radio with an instructor injected trouble, the learner will select correctly the proper test equipment to efficiently locate the trouble and will use the correct hand tools and soldering equipment to correct the trouble.	14.1	Your instructor will put a trouble in your receiver, you will proceed in logical sequence through the following steps to locate and repair the trouble: 1. Determine the trouble 2. Confirm the trouble 3. List the possible causes of the trouble. 4. Inspect for surface defects 5. Isolate the defective section. 6. Isolate the defective stage. 7. Isolate the defective circuit. 8. Isolate the defective part. 9. Repair or replace the defective part. 10. Check performance You will be evalualated at all times on your ability to proceed efficiently, your selection of the proper test equipment, use of hand tools, neat and correct soldering, general overall performance and safety.

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 15.0

ALIGNMENT PROCEDURES

The learner will describe in writing the symptom of misalignment, list the equipment required for alignment, describe the procedure for aligning an AM receiver and perform a complete alignment of an AM receiver.

No.	Intermediate Performance Objectives	No.	Criterion Measures
15.1	The learner will describe in writing the symptoms that indicate misalignment of the following sections. 1) The I. F. amplifiers 2) The local oscillator 3) The pre-selector.	15.1	Describe in writing, the symptoms that would be noted in a receiver that would indicate a misalignment of each of the following sections: 1) IF amplifier 2) Local oscillator 3) Pre-selector
15.2	The learner will list the tools and equipment needed for alignment of an AM receiver and describe the function of each. 1) Alignment tools 2) Signal generator 3) Output meter	15.2	List the tools and test equipment that you would need to perform an alignment and describe the function of each one: 1) How is the signal generator connected to the set? 2) What type of meter should be used and how should it be connected to the set to obtain a usable indication for alignment 3) How can you determine the correct IF frequency of the receiver if it is not given? 4) Where should the receiver tuning and volume controls be set? 5) In what order should the alignment steps be carried out? 6) What should be done if a signal of the correct IF does not result in an output? 7) Where should the signal gen. attenuator controls be set? 8) Is it necessary to adjust the trimmers in any particular order?
15.3	The learner will describe the procedures for alignment of an AM Receiver by correctly answering 6 of 7 given questions.		

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 15.0

ALIGNMENT PROCEDURES

No.	Intermediate Performance Objectives	No.	Criterion Measures
15.4	The learner will correctly perform a complete alignment of a typical AM receiver.	15.4	Given a typical AM receiver you are to select the proper equipment and tools, connect the equipment properly and perform a complete alignment of receiver.

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 16.0 TURNTABLES

The learner will, with 80% accuracy, list the sequence of events that occur during one complete cycle of record changer operation, describe the 3 most often used types of tripping mechanisms, describe the best method of adjusting the indexing systems, describe the 2 types of record dropping mechanisms most often used, and correctly perform test, adjustment and lubrication procedures on a typical turntable.

No.	Intermediate Performance Objectives	No.	Criterion Measures
16.1	The learner will list in sequence, the events that normally occur during one complete cycle of record changer operation at 80% accuracy.	16.1	List, in their order of occurance, the events that normally occur during one complete cycle of record changer operations.
16.2	The learner will describe the operation of the 3 most often used types of tripping mechanisms. 1) the position trip 2) the velocity trip 3) the eccentric trip	16.2	Name the 3 most common types of tripping mechanisms and describe their operation in writing.
16.3	The learner will describe the best method for adjusting the indexing system.	16.3	Describe the best method for adjusting the indexing system.
16.4	The learner will describe the two most popular record dropping mechanisms. 1) the spindle type 2) the pusher type	16.4	Name and describe the 2 most popular record dropping mechanisms
16.5	Given a turnable which has been previously misadjusted by the instructor, the learner will test, adjust and lubricate, using correct procedure to put the turntable back in operating condition.	16.5	The instructor will give you a typical turntable that is out of adjustment. You are to test, adjust and lubricate the turntable so that it operates normally.

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 17.0

TAPE RECORDERS

The learner will describe the function of each section of a typical playback amplifier, decribe the function of each of the major mechanical parts of a record/playback mechanism, trace DC and signal paths through a typical record/playback amplifier, describe maintenence and adjustment procedures as they apply to tape heads, wheels & pulleys, brakes, bias oscillators, level calibration, meter calibration and motor speed.

No.	Intermediate Performance Objectives	No.	Criterion Measures
17.1	Given a block diagram of a typical record/playback amplifier, the learner will describe the function of: 1) Record/playback head 2) Erase head 3) Preamplifier 4) Record equalization 5) Playback equalization 6) Audio power amplifier 7) Bias oscillator	17.1	Given a block diagram of a typical record/playback amplifier, you are to describe the function of each section of the amplifier.
17.2	Given a simplified diagram of the mechanical parts of a record/playback mechanism, the learner will describe the function of: 1) Supply spindle 2) take-up spindle 3) drive sheave 4) idler 5) idler drive 6) pinch roller 7) capstan 8) flywheel 9) pressure pads 10) brake	17.2	Given a simplified diagram of the mechanical parts of a record/playback mechanism, describe the function of, and name each of the parts in the diagram.
17.3	Given a schematic diagram of a typical record/playback amplifier, the learner will correctly trace the DC current paths from the power supply through each stage and signal paths from input or record-head through the amplifierto the speaker.	17.3	Given a schematic diagram of a typical record/playback amplifier, correctly trace the DC current paths from the power supply through each stage and signal patns from output or record head to the speaker.

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 17.0

TAPE RECORDERS

No.	Intermediate Performance Objectives	No.	Criterion Measures
17.4	The learner will describe the maintenance and adjustment procedures as they apply to each of the following at 80% accuracy: 1) tape heads a. cleaning b. demagnetizing c. height and azimuth 2) Wheels and pulleys a. cleaning b. tensioning c. replacement 3) Brakes a. adjustment b. replacement 4) Bias oscillator a. amplitude b. check waveform c. setting bias trap 5) Level calibration 6) Meter calibration 7) Motor speed a. checking b. setting	17.4	Describe in writing the maintenance and adjustment procedures as they apply to the various mechanical and electronical parts of the tape player as requested. 1) tape heads a. cleaning b. demagnetizing c. height and azimuth 2) Wheels and pulleys a. cleaning b. tensioning c. replacement 3) Brakes a. adjustment b. replacement 4) Bias oscillator a. amplitude b. check waveform c. setting bias trap 5) Level calibration 6) Meter calibration 7) Motor speed a. checking b. setting

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 18.0 FM SETS

The learner will, with 80% accuracy, describe the advantages and disadvantages of Frequency Modulation, state the method used to modulate the frequency of a carrier, describe the difference between and FM IF amplifier and an AM IF amplifier (bandwidth), state the IF frequency most commonly used for FM receivers, describe the operation of a limiter stage and its purpose, describe the operation of a Slope Detector -Foster-Seeley discriminator, Ratio

No.	Intermediate Performance Objectives	No.	Criterion Measures
18.1	The learner will describe the advantages and disadvantages of Frequency Modulation at 80% accuracy.	18.1	Describe in writing, the advantages and disadvantages of FM.
18.2	The learner will describe the method used to modulate the frequency of a carrier wave at 80% accuracy.	18.2	Describe, in writing, the method used to modulate the frequency of a carrier wave.
18.3	The learner will describe the differences between the FM IF amplifier stages and the AM IF amplifier stages with particular emphasis on the bandwidth at 80% accuracy.	18.3	Describe, in writing, the differences in bandwidth consideration between FM and AM.
18.4	The learner will state the IF most commonly used in FM receivers. (10.7 MHz)	18.4	State the Intermediate frequency most commonly used in FM.
18.5	The learner will describe the operation of a limiter stage and its purpose with 80% accuracy.	18.5	Describe the operation and state the purpose of a limiter stage.
18.6	Given a schematic diagram of each of the following, the learner will correctly name the circuit and describe its operation, stating also whether that circuit must be preceded by a limiter or not at 80% accuracy. 1) Slope Detector 2) Foster- eeley discriminator 3) Ratio detector 4) Gated beam demodulator	18.6	Identify each of the following circuits and describe the operation of each 1) Slope Detector 2) Foster-Seeley discriminator 3) Ratio detector 4) Gated beam demodulator.

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 18.0 (cont'd)

FM SETS

detector and a Gated beam demodulator, stating which will require a limiter stage and which will not Trace DC current and signal paths through a typical FM receiver.

No.	Intermediate Performance Objectives	No.	Criterion Measures
18.7	Given a schematic diagram of a typical FM receiver, the learner will trace the DC current paths from the power supply through each stage and the signal path from antenna to speaker at 80% accuracy.	18.7	Given a schematic diagram of an FM receiver, correctly trace the DC current paths and signal paths as directed.
18.8	Given a schematic diagram of a typical AM/FM combination receiver, the learner will trace DC current paths and signal paths with switch in AM position and with switch in FM position at 80% accuracy.	18.8	Given a schematic diagram of an AM/FM receiver, correctly trace the DC current paths and signal paths with the switch in each position.

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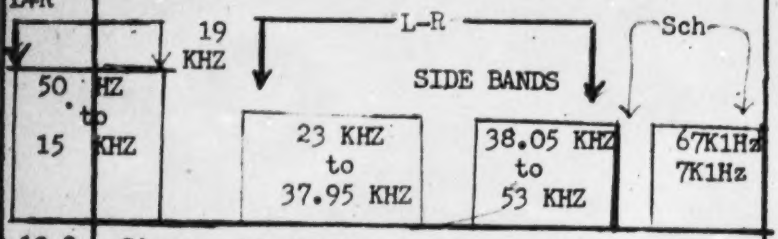
COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 19.0

STEREO SETS

The learner will, with 80% proficiency, describe the FM multiplex signal showing the distribution of the multiplex stereo transmission. Identify and describe the stages of a matrixing-type Multiple unit. Describe the operation of a multiplex matrixing-switching type multiplex on a typical FM stereo schematic diagram. Describe the equipment used and steps necessary to perform an alignment of a typical stereo set.

No.	Intermediate Performance Objectives	No.	Criterion Measures
19.1	The learner will draw a blockdiagram showing the frequency distribution of a multiplex stereo transmission at 80% accuracy.	19.1	Draw a diagram illustrating the frequency distribution of a multiple stereo transmission.
19.2	Given a block diagram of a matrixing type multiplex circuit, the learner will identify and state the purpose for each of the following at 80% accuracy: 1) L+ R Low Pass filter 2) Time delay circuit 3) L - R Bandpass filter 4) L - R Detector 5) 19 KHz filter 6) Frequency doubler 7) Matrix 8) L and R de-emphasis circuit	19.2	Given a block diagram of a matrixing type multiplex circuit, identify, in writing, and state the purpose for each of the following: 1) L+ R Low Pass filter 2) Time dealy circuit 3) L-R Detector 4) L-R Bandpass filter 5) 19 KHz filter 6) Frequency doubler 7) Matrix 8) L and R de-emphasis cir.
19.3	Given a schematic diagram of each of the following circuits, the learner will identify the type of circuit and describe its operation at 80% accuracy: 1) a multiple matrixing detector 2) switching type multiple detector 3) the biplex detector	19.3	Given schematic diagrams of 3 types of stereo detectors,, identify the circuit in writing and describe the operation of the circuit.



ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 19.0

STEREO SETS

No.	Intermediate Performance Objectives	No.	Criterion Measures
19.4	Given a schematic diagram of a typical FM stereo multiplex receiver, the learner will trace the signal from antenna to speakers, describing the complete processing of the signal at 80% accuracy.	19.4	Given a schematic diagram of a typical FM stereo multiplex receiver trace the signal from antenna to speaker, describing the complete processing of the signal.
19.5	The learner will describe the equipment used and the steps necessary to perform an alignment of a typical stereo set at 80% accuracy.	19.5	List the equipment necessary and the steps to be followed to perform an alignment of a typical stereo multiplex set.

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 20.0

BLACK & WHITE TELEVISION HISTORY

The learner will, with 80% proficiency, state and describe those events and developments which led to the development of the television industry, describe the construction and operation of the cathode ray tube (with both electrostatic and electromagnetic deflection), illustrate and describe the frequency distribution of the television signal, illustrate and identify the components in a composite television signal, draw a block diagram of the monochrome television receiver identifying and describing the function of

No.	Intermediate Performance Objectives	No.	Criterion Measures
20.1	The learner will list chronologically those developments and events which led to the present development of the television industry at 80% accuracy.	20.1	List, in writing, chronologically, those developments and events which led to the present development of the television industry.
20.2	Given a diagram of a cathode ray tube the learner will identify all components and describe the function of each. The learner will describe the operation of the CRT with electrostatic and electromagnetic deflection at 80% accuracy.	20.2	Given a diagram of a cathode ray tube, identify, in writing, all of the components and describe the function of each. Also describe the operation of the CRT with electromagnetic deflection
20.3	Given the frequency range of a particular channel, the learner will draw a frequency distribution diagram showing the location of each of the following at 80% accuracy. 1) Picture carrier 2) Picture aide-band 3) Sound carrier 4) Adjacent channel video carrier 5) Adjacent channel sound carrier	20.3	Draw a frequency distribution diagram of a given television channel showing the location of the following: 1) Picture carrier 2) Picture side-bands 3) Sound carrier 4) Adjacent channel video carrier. 5) Adjacent channel sound carrier.
20.4	The learner will draw a frequency distribution diagram for the television video IF at 80% accuracy.	20.4	Draw a frequency distribution diagram for the television video IF.

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 20.0 (cont'd)

BLACK & WHITE TELEVISION HISTORY

each stage.

No.	Intermediate Performance Objectives	No.	Criterion Measures
20.5	Given a diagram of a modulated video signal (as it would appear on O'scope) the learner will identify the following at 80% accuracy. 1) Sync pulses 2) Blanking level 3) video 4) front and back porch	20.5	Given a diagram or picture of a modulated video signal, identify the following: 1) Sync Pulses 2) Blanking level 3) video 4) front and back porch
20.6	The learner will draw a block diagram of a typical monochrome television receiver, identifying and stating the purpose for each section at 80% accuracy.	20.6	Draw a block diagram of a typical monochrome television receiver, identify each section and state its purpose.

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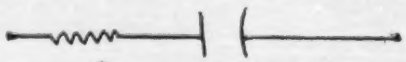
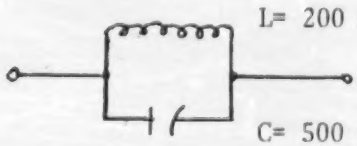
COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 21.0

Television Math Application

The learner will, with 80% proficiency, review electrical and electronic mathematics, demonstrate his ability to solve related mathematical problems with special emphasis on inductance and capacitance action at television frequencies.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
.1	The learner will solve RC and RL time constant problems with special emphasis on circuits in the horizontal and vertical frequency range at 80% accuracy.	21.1	a.  2.2 M .007 ufd. RC Time = _____ sec. b. 4.7 K .3h RL Time = _____ sec.
21.2	The learner will solve problems involving inductive reactance, capacitive reactance and resonance with special emphasis on circuits in the horizontal, vertical and IF frequency ranges at 80% accuracy.	21.2	a. Calculate the inductive reactance of a 2 milli henry coil at: 60H - _____ OHMS 15,750H - _____ OHMS 44MH - _____ OHMS b. Calculate the capactive reactance of a .01 ufd capacitor at: 60H - _____ OHMS 15,750H - _____ OHMS 44MH - _____ OHMS c. (1) What is the resonant frequency of the circuit shown below  L= 200 millihenrys C= 500 pfd. Res. Freq.= _____ H_2 (2) Which circuit would this tank circuit be formed in? 1. IF 2. VERT 3. HORIZONTAL

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE
OBJECTIVE NO. 22.0 BASIC BLACK & WHITE TV SERVICING

The learner will, with 80% proficiency, identify all controls on a typical monochrome receiver, describe the effect that each control has upon receiver operation, perform a typical television installation, perform a typical television service call, associate probable cause with a variety of typical receiver trouble symptons.

No.	Intermediate Performance Objectives	No.	Criterion Measures
22.1	Given a typical monochrome television receiver, the learner will identify in writing each of the controls and state the effect that each will have upon receiver operation with 80% accuracy.	22.1	Identify all of the controls on a typical monochrome receiver and describe in writing the function of each.
22.2	The learner will perform a typical television installation assuring that antenna and power are correctly connected and all controls are adjusted for best performance at 80% accuracy.	22.2	Perform a typical television installation, making all connections and adjusting controls for best performance.
22.3	The learner will perform a typical service call which will include the following at 80% accuracy: 1) fill out service ticket 2) identify customer complaint 3) operate receiver to confirm complaint 4) determine most likely cause of complaint 5) correct trouble if possible through adjustment, repair or replacement of easily replaced components. 6) bill customer for service call and parts used or private customer with estimate if set is to be removed.	22.3	Perform a typical service call as directed.
22.4	Given pictures of television picture tube indications and descriptions of receiver symptons, the learner will correctly associate sympton to defective section at 80% accuracy.	22.4	Given 20 descriptions of television symptons along with their picture tube indications, correctly associate at least 16 to the defective section.

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 23.0

SHOP TECHNIQUES & MATERIALS

The learner will, with not less than 80% proficiency, be able to disassemble and reassemble a television set, remove and reinstall a television picture tube, test vacuum tubes by tester and substitution, remove, clean and reinstall a television tuner, perform high voltage tests and use the CRT tester to test picture tube.

No.	Intermediate Performance Objectives	No.	Criterion Measures
23.1	The learner will disassemble a television receiver, removing chassis yoke tuner and speaker, placing all components on the work bench properly connected for safe and efficient bench maintenance with all loose parts properly bagged and tagged and secured to prevent loss.	23.1	Disassemble a television receiver and prepare it for bench operation and maintenance.
23.2	The learner will reinstall chassis, yoke, tuner and speaker in television cabinet properly securing all components, replacing all knobs, and correctly connecting all components, put power on the test and adjust for power operation.	23.2	Install all components of a receiver in the TV cabinet, adjust and check for proper operation.
23.3	The learner will remove and reinstall a picture tube using correct procedures to prevent damage to tube or set, using correct apparel to prevent injury in the event of an implosion.	23.3	Perform a picture tube replacement, observing all personal and equipment safety procedures.
23.4	The learner will test television tubes by substitution and by using a tube tester.	23.4	Test vacuum tubes by both the substitution and tester method.
23.5	The learner will remove and clean a television vision tuner using correct procedures and materials to prevent damage and insure proper operation, reinstall and test operation.	23.5	Properly clean a television tuner and check for proper operation.
23.6	The learner will use a high voltage tester to test 2nd anode voltage.	23.6	Use the high voltage tester to test 2nd. anode voltage. Use the CRT tester to test the operation of a picture tube, using rejuvenation and short removal as required.
23.7	The learner will use a CRT tester to test picture tube, describe operation of rejuvenation controls and short removal controls.		

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 24.0 TELEVISION AUDIO CIRCUITS

The learner will, with 80% proficiency, describe the intercarrier sound system used in television, state the audio IF frequency, describe the method of obtaining the audio IF, identify the location of sound take- - off in a monochrome receiver, name 3 types of sound detectors used in television receivers, identify troubles associated with television receivers, identify troubles associated with television sound circuits, locate and adjust quadrature coil.

No.	Intermediate Performance Objectives	No.	Criterion Measures
24.1	The learner will draw a frequency response diagram of a television tuner to a given channel showing location of picture signal and sound signal at 80% accuracy.	24.1	Draw a frequency response diagram of a television tuner showing location of sound and picture carriers.
24.2	The learner will draw a frequency response diagram for the television IF stages showing location of picture signal and sound signal with 80% accuracy.	24.2	Draw a frequency response diagram for the television IF, showing location of sound and picture carriers.
24.3	The learner will state the audio IF frequency and describe the method of obtaining the audio IF frequency in a television receiver.	24.3	The television sound IF frequency is _____ hertz and it is obtained by beating the sound carrier against the _____ carrier.
24.4	The learner will describe the location of the sound take-off point in monochrome receivers and given a schematic diagram of a typical monochrome receiver the learner will trace audio signal from tuner to speaker, describing the action of each stage of the receiver as he proceeds.	24.4	The sound is normally taken off from the _____ stage in a monochrome TV. You will be given a schematic diagram of a typical monochrome TV circuit. Trace the sound signal from tuner to sound detector through Audio IF and audio amp to speaker.
24.5	The learner will identify and describe the operation of the 3 types of audio detectors with 80% accuracy: 1) limiter detector 2) ratio detector 3) quadrature grid detector	24.5	Identify and describe the operation of 3 types of audio detectors.

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 24.0 TELEVISION AUDIO CIRCUITS

No.	Intermediate Performance Objectives	No.	Criterion Measures
24.6	Given several examples of typical television receiver troubles, the learner will be able to select those which are associated with sound circuits and explain why the others could not be in the sound circuits at 80% accuracy.	24.6	You will be given examples of several television troubles, some in the sound circuits and some not. Determine from the overall symptons which troubles originate in the sound circuit and which do not and why not.
24.7	Given a television receiver with the sound circuits deliberatly misadjusted, the learner will perform the correct steps in the proper sequence to adjust the quadrature coil, sound take-off transformer and buzz control at 80% accuracy.	24.7	Perform quadrature coil, sound take-off transformer and buzz control adjustments to restore a television sound circuit to proper operation.

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 25.0

VIDEO CIRCUITS

The learner will, with 80% proficiency, describe methods used to extend the frequency response of an amplifier, state the reason that the video amplifier must have a wide frequency response, identify those components. (peaking coils, capacitors and resonant loading resistors) in a video circuit which are used to extend the frequency response, identify picture symptons associated with poor low and high frequency response, state the polarity of the picture signal when

No.	Intermediate Performance Objectives	No.	Criterion Measures
25.1	The learner will state the reason why the response of an amplifier will drop as the frequency of the signal increases and describe the methods used to increase the high frequency response of a video amplifier at 80% accuracy.	25.1	Describe the reasons why the response of an amplifier tends to drop as the frequency of the signal increases, and describe the methods that may be used to prevent the response from dropping.
25.2	The learner will state the reason why the response of an amplifier will drop as the frequency of the signal decreases and describe the methods used to increase the low frequency response of a video amplifier at 80% accuracy.	25.2	State the reason that the response of an amplifier tends to drop as the frequency of the signal decreases and describe the methods that may be used to extend the low frequency response.
25.3	The learner will state the reason why a video amplifier must have a wide frequency response.	25.3	The video signal contains frequencies that range from _____ to _____.
25.4	Given a diagram of a typical video amplifier the learner will identify those components in the circuit which are intended to extend the frequency range of the amplifier, stating which will effect low frequency response and which will effect high frequency response at 80% accuracy.	25.4	Given a diagram of a typical video amplifier, identify the components which are intended to extend the high frequency response and the components intended to extend the low frequency response.

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 25.0 VIDEO CIRCUITS

(cont'd)

applied to the cathode of a picture tube and when applied to the grid, use O'scope to measuring peak-to-peak voltages and identifying improper response of stage, describe the effect of losing DC component of picture signal and identify those components which can cause such loss, use square wave generator and O'scope to test operation and frequency response of video circuits.

No.	Intermediate Performance Objectives	No.	Criterion Measures
25.5	Given a number of pictures showing typical symptons of trouble on the picture tube the learner will select those which are associated with video circuit trouble and identify those that are associated with poor high & low frequency response at 80% accuracy.	25.5	Given a number of typical television troubles, select those which probably originate in the video circuits and identify those that are an indication of poor high frequency response and those that indicate poor low frequency response.
25.6	The learner will state the polarity of the picture signal when applied to the cathode of the picture tube.	25.6	When the picture signal is applied to the cathode of the picture tube, its polarity must be _____.
25.7	The learner will state the polarity of the picture signal when applied to the grid of the picture tube.	25.7	When the picture signal is applied to the grid of the picture tube, its polarity must be _____.
25.8	Given a typical monochrome television receiver the learner will use an O'scope to trace the video signal from video detector to picture tube, measuring peak-to-peak voltages and identifying proper and improper response of stage at 80% accuracy.	25.8	Trace a video signal through a typical video amplifier with an O'scope, measuring the peak-to-peak voltages and checking for proper response of each stage.
25.9	The learner will describe what is meant by the DC component of the picture signal and describe the effect of losing the DC component at 80% accuracy.	25.9	Describe what is meant by the DC component of the video signal and illustrate what happens to the video signal when the DC component is lost.
25.10	Given a diagram of a typical monochrome receiver, the learner will identify the circuits and components which provide the DC component at 80% accuracy.	25.10	On a schematic diagram of a typical B & W receiver, identify the circuits and components which provide the DC component.
25.11	Given a typical monochrome receiver the learner will use a square wave generator to test the video circuits for high & low frequency response at 80% accuracy.	25.11	Perform square wave testing of a video amplifier to test high and low frequency response.

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 26.0

TUNER CIRCUITS

The learner will name the three stages in a VHF tuner, describe the two functions that a tuner must perform, describe the function that the VHF RF amplifier and Mixer perform when the receiver is tuned to UHF, describe the function of a "Balun". Describe the method used to change the resonant frequency of the tuned circuits, describe the difference between rotary switch and drum type tuners, identify television symptoms associated with tuner trouble, state the most common trouble with tuners.

No.	Intermediate Performance Objectives	No.	Criterion Measures
26.1	The learner will name the three stages in a VHF tuner and describe the function of each: 1) RF amplifier 2) oscillator 3) mixer	26.1	Name the 3 stages of a VHF tuner and describe the function of each.
26.2	The learner will describe the two functions that a tuner must perform: 1) select the disired channel 2) produce the IF frequency	26.2	Describe the two functions that a tuner must perform.
26.3	The learner will describe the function of the RF amp. and Mixer in the VHF tuner when UHF is selected.	26.3	What function does the RF amplifier and Mixer in the VHF tuner perform when you select UHF.
26.4	The learner will identify and describe the function of a "Balun".	26.4	What is a "Balun".
26.5	The learner will describe the method used to change the resonant frequency of the tuned circuits in the tuner.	26.5	How is the resonant frequency of the tuned circuits in the tuner changed when you go from one channel to another.
26.6	The learner will describe the mechanical and structural differences between a rotary switch tuner and a drum type.	26.6	Describe the mechanical and structural differences between a rotary switch and drum type tuners
26.7	Given a variety of trouble symptoms the learner will identify those which are most likely to originate in a defective tuner.	26.7	Given a variety of trouble symptoms identify those which are most likely to have orginated in the tuner.
		26.8	What is the most common trouble that occurs with tuners?

ACCREDITATION NUMBER 9784

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 27.0

SYNC CIRCUITS

The learner will identify those parts of the composite television signal which are the sync signals and describe their purpose, describe the differences between the horizontal and vertical sync signals, describe the purpose of the equalizing pulses, state the percentage of television signal amplitude which comprises the sync signals, describe the function and operation of the sync separator stage, identify the input and output wave forms of the sync separator

No.	Intermediate Performance Objectives	No.	Criterion Measures
27.1	Given pictures of actual O'scope presentations of composite video signal the learner will identify those parts which make up the sync signals.	27.1	Identify those parts of the composite television signal which make up the sync signals.
27.2	The learner will state the purpose of the sync signals.	27.2	The purpose of the sync signals is _____.
27.3	The learner will describe the horizontal, vertical and equalizing pulses in terms of their frequency and pulse width.	27.3	Describe the horizontal vertical and equalizing pulses in terms of their frequency and pulse width.
27.4	The learner will state the percentage of the television signal amplitude which should comprise the sync signals.	27.4	If the television tuner and IF stages are operating normally the sync signals will be _____ percent of the overall television signal amplitude.
27.5	The learner will describe the functions and operation of a sync separator stage and identify the correct input and output signals at the sync separator stage.	27.5	Answer the following questions in your own words: 1) What is the purpose of the sync separator stage. 2) How does it operate? 3) Draw a picture to represent the input signal and the signal and the signal as seen at the vertical rate.
27.6	The learner will identify and describe the operation of the integrator and differentiator circuits.	27.6	Given a schematic diagram, identify and describe the operation of the integrator and differentiator circuits.

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 27.0 (cont'd) SYNC CIRCUITS

(cont'd)
stage, identify and describe the function of the integrator and differentiator circuits, describe the operation of a noise cancelling circuit, describe the operation of the Gated AGC circuit, name the two signal inputs to thegated AGC stage and explain the purpose of the output. Use O'scope to examine signals in sync circuit from take-off point to input to sweep circuits.

No.	Intermediate Performance Objectives	No.	Criterion Measures
27.7	The learner will describe the operation of a noise cancelling circuit.	27.7	Describe, in writing, the operation of a noise cancelling circuit.
27.8	The learner will identify and describe the operation of a gated AGC circuit, state the source of its input signals and the purpose of its output.	27.8	1) Describe the operation of the Gated AGC circuit. 2) What is the source of the two input signals to the gated AGC circuit. 3) The output of the gated AGC circuit is fed to what two stages.
27.9	Given a typical monochrome television the learner will use an O'scope to examine and trace the synchronizing signals from the take-off point through the sync separator to the input to the sweep circuits, measuring their peak-to-peak value and examining their shape.	27.9	Use the O'scope to examine the waveforms in the sync circuits, making measurements and observations as required on problem sheet.
27.10	Given a number of illustrations and descriptions of typical television trouble symptons, the learner will select those which are likely to be associated with sync circuit malfunctions.	27.10	Given a number of typical television trouble symptons select those which most likely originate in a faulty sync circuit.

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 28.0

SWEEP CIRCUITS

The learner will, with 80% proficiency, describe the formation of a scaning raster by electromagnetic deflection, state the horizontal and vertical frequency, state the number of scanning lines per field and the number of fields per frame and the number of frames per second, define the term "interlaced fields", describe the type of wave shape required to produce deflection of the electron beam, describe the operation of a blocking oscillator and a multivibrator, describe the procedure for using the sync signals to synchronize the sweep oscillators.

No.	Intermediate Performance Objectives	No.	Criterion Measures
28.1	The learner will describethe formation of a scanning raster using electromagnetic deflection at 80% accuracy.	28.1	Illustrate and describe in writing the formation of a scanning raster using electromagnetic deflection.
28.2	The learner will state the horizontal and vertical frequency 1) Hor. - 15,750 Hz 2) Vert. - 60 Hz	28.2	The horizontal deflection frequency is _____, the vertical is _____.
28.3	The learner will state the number of lines per field. (262.5)	28.3	The number of horizontal lines per field is _____.
28.4	The learner will state the number of fields per frame. (2)	28.4	The number of fields per frame is _____.
28.5	The learner will state the number of frames per second. (30)	28.5	The number of frames per second is _____.
28.6	The learner will state the length of time it takes to make one hor. sweep. (64 micro seconds)	28.6	The time required for one horizontal sweep is _____.

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 28.0 (cont'd) SWEEP CIRCUITS

(cont'd) describe the function and operation of the vertical hold, vertical linearity, and height controls, describe the function of the fly-back transformer and the formation of the horizontal sweep, describe damper and the formation of the horizontal sweep, describe the method used by the picture tube to store the high voltage, identify trouble symptons associated with vertical and horizontal sweep malfunctions, perform ringing tests on yoke units,

No.	Intermediate Performance Objectives	No.	Criterion Measures
28.7	The learner will define the term "interlaced field."	28.7	Define the term "interlaced fields".
28.8	The learner will describe the wave shape needed to produce deflection.	28.8	Illustrate and describe the wave shape needs to produce deflection.
28.9	Given a schematic diagram of a blocking oscillator the learner will describe the operation and identify those components which primarily control the frequency of the oscillator at 80% accuracy.	28.9	Describe the operation of a blocking and identify the components which control the frequency.
28.10	Given a schematic diagram of a multivibrator circuit, the learner will describe the operation and identify the components which primarily control the frequency of the oscillator at 80% accuracy.	28.10	Describe the operation of a multivibrator and identify the components which control the frequency of the oscillator.
28.11	The learner will describe the procedure for using the vertical sync signals to regulate the speed of the vertical oscillator at 80% accuracy.	28.11	Describe the method used for the vertical sync signals to control the speed of the vert. osc.
28.12	The learner will identify a comparator circuit and describe how it processes the horizontal sync signal to provide a controlling voltage for the horizontal oscillator at 80% accuracy.	28.12	By illustration and description, tell in your own words how the comparator operates to produce a controlling voltage to regulate.
28.13	Given a schematic diagram of a typical vertical sweep circuit, the learner will identify and describe the operation of the vertical hold, vertical linearity and height controls at 80% accuracy.	28.13	Identify and describe the operation of the vertical hold, vertical line, and height control.
28.14	The learner will describe the operation of the horizontal fly-back transformer and the formation of the high voltage at 80% accuracy.	28.14	Describe the operation of the horizontal output, fly-back and the formation of the high voltage.

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 28.0 (cont'd) SWEEP CIRCUIT

(cont'd) identify and describe the operation of the horizontal linearity, width controls, perform horizontal efficiency adjustment and explain the purpose of this adjustment.

No.	Intermediate Performance Objectives	No.	Criterion Measures
28.15	The learner will describe the function of the high voltage rectifier at 80% accuracy.	28.15	Describe the operation of the high voltage rectifier, and explain its purpose.
28.16	The learner will describe the function of the damper and the formation of the horizontal sweep at 80% accuracy.	28.16	Describe the operation of the damper circuit and the formation of the horizontal sweep.
28.17	The learner will describe the construction of the picture tube which allows it to act as a capacitor and store the high voltage at 80% accuracy.	28.17	By illustration and by description tell how the picture tube is constructed to allow it to act as a capacitor and store high voltage.
28.18	Given a number of illustrations and descrptions of typical television trouble symptons the learner will select those that are associated with vertical and horizontal sweep malfunctions at 80% accuracy.	28.18	Identify troubles that originate in the vertical and horizontal sweep circuits.
28.19	Given typical television receivers with instructor injected vertical and horizontal sweep troubles, the learner will perform waveform voltage and resistance tests to locate and correct the trouble at 80% accuracy.	28.19	Locate and correct troubles in the vertical and horizontal sweep circuits of a typical monochrome receiver.
28.20	The learner will perform O'scope ringing tests on horizontal output stages, flyback and yoke circuits, correctly discriminating between faulty and good indications at 80% accuracy.	28.20	Use the O'scope to perform ringing tests in the horizontal output stage.
28.21	Given a schematic diagram of a typical horizontal sweep circuit, the learner will identify and describe the operation of the horizontal hold, horizontal linearity, and width controls at 80% accuracy.	28.21	Identify and describe the operation of the horizontal hold, horizontal linearity and width controls.

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO.28.0 (cont'd) SWEEP CIRCUITS

No.	Intermediate Performance Objectives	No.	Criterion Measures
8.22	Given a typical television receiver, the learner will perform the horizontal efficiency adjustment and explain the reason for such adjustment at 80% accuracy.	28.22	Perform a horizontal effiency adjustment and explain the reason for the adjustment.

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 29.0

TV SERVICING AND ALIGNMENT

The learner will, with 80% proficiency, identify trouble symptons which are likely to be caused by receiver misalignment, identify the frequency markers on a typical IF response curve, perform complete allignment of video IF and sound stages in a typical television receiver.

No.	Intermediate Performance Objectives	No.	Criterion Measures
29.1	Given a number of illustrations and descriptions of typical receiver troubles, the learner will select those that are likely to be associated with receiver misalignment at 80% accuracy.	29.1	Identify television trouble symptons that are likely to originate in receiver misalignment
29.2	The learner will draw a typical video IF response curve, properly locating all markers and identifying each by purpose and reason for its specific location on the response curve at 80% accuracy.	29.2	Draw a typical video IF response curve, state the purpose for each marker and reason for its location.
29.3	Given a typical television receiver with alignment instructions and a B&K Marker generator, the learner will set up and connect all necessary equipment of the video IF and sound stages according to the alignment instructions at 80% accuracy.	29.3	Perform a complete video IF and sound alignment of a typical television receiver.
29.4	The learner will state that the only time that the tuned circuits in the video IF are touched is during the actual alignment when all necessary equipment is available.	29.4	When are you allowed to touch the tuned circuits in the video IF stages?

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 30.0

TV ANTENNA INSTALLATION

The learner will, with 80% proficiency, define "line-of-sight" as it refers to the behavior of TV signals, describe reflections, what causes them and how they effect the picture, describe the dipole and folded dipole antenna, describe parasitic elements and their purpose on the antenna, describe the log-periodic antenna and its purpose and its advantages, define the meaning of primary/ secondary/ and fringe service areas and describe the type

No.	Intermediate Performance Objectives	No.	Criterion Measures
30.1	The learner will state the meaning of line-of-sight, and describe its effect upon transmission and reception of television signals with 80% proficiency.	30.1	What does line-of-sight mean and how does it effect television transmission?
30.2	The learner will describe reflections and state what causes them and how they effect the picture with 80% proficiency.	30.2	What are reflections, what causes them and how do they look?
30.3	The learner will describe a dipole and a folded dipole stating the impedance of each with 80% accuracy.	30.3	Describe a dipole and a folded dipole and state the impedance of each.
30.4	The learner will describe the parasitic elements, giving the relative size, location and purpose of directors and reflectors.	30.4	Given illustrations or examples of television antenna identify and state the purpose of the directors and reflectors.
30.5	The learner will identify and describe the advantages of a log-periodic antenna at 80% accuracy.	30.5	Identify and state the advantages of a log-period antenna.
30.6	The learner will define the meaning of each of the following service areas and match the service area to the type of antenna installation most satisfactory at 80% accuracy. 1) primary 2) secondary 3) fringe	30.6	Describe the three types of service areas and state the type of antenna that will be satisfactory in each.

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE
OBJECTIVE NO. 30.0 (con't) TV ANTENNA INSTALLATION
(cont'd)
of antenna that will be satisfactory in each, identify and describe advantages of various types of lead-in, describe advantages and disadvantages of various types of lead-in, describe methods and purpose of antenna lead-in matching equipment, perform a typical television antenna installation using nescessary hardware to secure antenna and lead-in properly and make connection to set.

No.	Intermediate Performance Objectives	No.	Criterion Measures
30.7	The learner will identify and describe the advantages and disadvantages of impedance of each of the following types of lead-in wire at 80% proficiency. 1) Coaxial line 2) twin lead 3) tubular twin lead 4) shielded twin lead	30.7	Given illustrations or samples of the following types of lead-in wire, identify each and describe the impedance, the advantage and the disadvantages of each. 1) coaxial line 2) twin lead 3) tubular twin lead 4) shielded twin lead
30.8	The learner will describe equipment used for matching lead-in to set, and state the reasons for it.	30.8	Identify and describe the purpose for antenna lead-in matching equipment.
30.8	Given a typical antenna installation problem the learner will select the correct tools and hardware, properly mount and secure the antenna, route and secure the lead-in, make proper connection to the set and check operation and direction at 80% accuracy.	30.9	Perform a typical antenna installation.

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 31.0

FLORIDA LAW

The learner will, with 80% accuracy, describe the purpose of the "Florida Electronics Service Act of 1970", State the duties of the "Director" of the bureau of electronic repair dealers, describe the membership and duties of the "Advisory board", list those acts or omissions which may be cause for revocation of registration, describe procedures for appeal and for adjustment of complaints.

Note: It is intended that this performance objective be updated as often

No.	Intermediate Performance Objectives	No.	Criterion Measures
1.1	The learner will describe the purpose of the Electronic Service Act of 1970 at 80% accuracy.	31.1	Describe the purpose of the Electronic Service Act of 1970.
31.2	The learner will state the duties of the Director and describe the qualifications for the "Chief" of the bureau of electronic repair dealers at 80% accuracy.	31.2	The duties of the Director are 1. _____ 2. _____ 3. _____ and the director shall appoint a Chief of the Bureau who has had _____ years experience in the electronic repair business immediately preceding his appointment.
31.3	The learner will describe the number and qualifications of the members of the Advisory board and their duties at 80% accuracy.	31.3	The Advisory board shall consist of _____ members. _____ members shall have been engaged in the electronic repair business for at least _____ years.
31.4	The learner will list, and describe those acts or omissions which when done by a service dealer may result in revocation of registration at 80% accuracy.	31.4	List and describe 6 acts or omissions which may result in a service dealer losing his registration.
31.5	The learner will describe the service dealers requirements concerning each of the following at 80% accuracy. 1. invoice 2. parts 3. estimates 4. records	31.5	Describe the requirements and regulations concerning each of the following: 1. Invoices 2. Parts 3. Estimates 4. Records
31.6	The learner will describe the procedure for appeal of loss of validation of registration.	31.6	In the event that an application registration is turned down or an existing registration invalidated the service dealer may appeal to _____.

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 31.0(cont'd) (cont'd)

FLORIDA LAW

as changes in law dictate.

No.	Intermediate Performance Objectives	No.	Criterion Measures
31.7	The learner will describe the manner in which a customer may register a complaint against a service dealer.	31.7	In the event that a customer wishes to register a complaint against a service dealer, he may do so to the _____.

ACCREDITATION NUMBER 9785

COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 32.0

EMPLOYEE/EMPLOYER/CUSTOMER RELATIONS

The learner will, with 80% proficiency, list the items that an employer must consider as part of his overhead expense. Identify the advantages of cleanliness in a shop, describe the effects of proper inventory control and storage, state the reasons for maintaining proper records, state the advantages of having test equipment and tools in proper working condition and describe the effects of broken test equipment and lost tools, state several reasons why

No.	Intermediate Performance Objectives	No.	Criterion Measures
32.1	The learner will prepare a list of 10 items which an employer must consider as overhead expenses at 80% accuracy. 1. Rent/payments on bldg. 2. Electric 3. Telephone (inc. advertising) 4. Insurance 5. Upkeep (equipment, tools) 6. Wages to employees 7. Expendables 8. Taxes 9. Trade pubs. and trade dues. 10. Advertising	32.1	List ten items that an employer must consider as overhead expenses.
32.2	The learner will prepare a cost-per-hour statement for shop from given list of overhead expenses.		
32.3	The learner will list 6 advantages that are gained by keeping the shop clean and neat. 1. More attractive to customers 2. Better working conditions 3. Fewer lost parts 4. Less chance of damage to equipment. 5. Safer 6. Decreases cost	32.4	List 6 advantages to be gained by keeping shop clean and neat.

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TERMINAL PERFORMANCE OBJECTIVE NO. 32.0(cont'd) EMPLOYEE/EMPLOYER/CUSTOMER RELATIONS

(cont'd)

starting salary may be lower than expected and the reasons that wages increase, identify the effects normally associated with good personal appearance and grooming, describe relationship of customer to shop, list several methods that can be used to build good customer relations, describe the qualifications for obtaining a CET certificate, list the goals of the CET program and of the electronic service organizations such as FESA, NEA, NATESA, ISCET.

No.	Intermediate Performance Objectives	No.	Criterion Measures
32.4	The learner will describe what is meant by good inventory control. 1. Know what is in shop 2. Know where each item is 3. Have a place for each item and keep it in that place. 4. Have a procedure for automatically replacing each item as it is used. (called a perpetual inventory)	32.4	State the factors that make up good inventory control for tools, equipment and parts.
32.5	The learner will describe five advantages to be gained from good inventory control. 1. Work is more efficient 2. Perform better maintenance 3. Inventory is easier to maintain 4. Overhead cost is reduced 5. Profits are increased	32.5	Describe five advantages to be gained from good inventory control.
32.6	The learner will list four reasons for maintaining records. 1. Required by law 2. For cost control 3. To maintain inventory 4. For tax purposes 5. For maintenance history	32.6	List 4 reasons for maintaining complete and accurate records.
32.7	The learner will list the advantages of having tools and test equipment in proper working condition. 1. Efficient servicing 2. Reduces cost 3. Better service 4. More enjoyable work 5. Increased profits	32.7	List the advantages to be gained by having tools and test equipment complete and maintained in good working order.
32.8	The learner will list the effects of broken test equipment and lost or defective tools. 1. Takes longer to do job 2. Costs more in time and material	32.8	List the effects of broken test equipment and lost or defective tools.

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 32.0 cont'd

EMPLOYEE/EMPLOYER/CUSTOMER RELATIONS

No.	Intermediate Performance Objectives	No.	Criterion Measures
	3. Quality of service is reduced 4. Work is hard 5. Customer unhappy		

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 32.0 (cont'd) EMPLOYER/EMPLOYER/CUSTOMER RELATIONS

No.	Intermediate Performance Objectives	No.	Criterion Measures
32.9	The learner will list the reasons why technician starting wages may not be as high as expected. 1. lack of experience 2. still learning 3. slow work 4. requires help and supervision	32.9	List several reasons why the techinician starting wages are not very high.
32.10	The learner will list the reasons why he may expect regular wage increases. 1. experience 2. knowledge increases 3. works faster 4. requires less help and supervision 5. becomes more valuable to employer	32.10	List the reasons why you can expect regular wage increases.
32.11	The learner will identify the effects that are associated with good personal appearance and grooming. 1. increases confidence(boss & customer) 2. increases self image 3. improves work habits	32.11	List the advantages to be gained from good personal appearance and good grooming.
32.12	The learner will list the personality traits which will improve his chances for advancement and improve his relationship with fellow employees. 1. respect for others opinions 2. ability to listen and appreciate advice 3. ability and willingness to carry out instructions 4. respect for others property 5. cheerfulness 6. promptness 7. helpful 8. dependable 9. honest 10. loyalty	32.12	List at least 8 personality traits which will improve your chances for advancement and improve your relationships with fellow employees.

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COURSE TITLE: RADIO/TELEVISION SERVICE II

TERMINAL PERFORMANCE OBJECTIVE NO. 32.0 cont'd

EMPLOYEE/EMPLOYER/CUSTOMER RELATIONS

o.	Intermediate Performance Objectives	No.	Criterion Measures
2.13	The learner will describe the relationship of the customer with the shop and his importance to the shop.	32.13	Describe the relationship between the customer and the shop and the importance of the customer to the shop.
2.14	The learner will list several methods that can be used to build good customer relations.	32.14	List several methods that can be used to improve customer relations.
2.15	The learner will identify the CET certificate, describe the qualifications for obtaining a CET.	32.15	What is meant by CET? What are the qualifications for becoming a CET?
2.16	The learner will describe the goals of the CET program and the electronics service organizations (FESA, NEA, NATESA, ISCET)	32.16	List and describe the goals of the CET program along with the goals of the electronic service organizations such as FESA, NEA, NATESA & ISCET.